INFORMATION PROVIDED BY WATER SOFTENER INDUSTRY REPRESENTATIVES RELATED TO THE POTENTIAL EFFECTS OF WATER SOFTENERS ON SEPTIC TANKS AND DRAINFIELDS

Alhajjar, B.J., 1981, The Effects of Electrolyte Concentration, Cation Absorption Ratio, and the Septic Tank Effluent Composition on Hydraulic Properties of Natural Swelling Soil Systems. M.S. Thesis, Dept. of Soil Science, University of Wisconsin -Madison.

Examines in detail the effect of softened water and regeneration back wash on drainfield soil hydraulic conductivity. Identifies several agents that alter hydraulic conductivity of soils under loading by sewage effluent. Finds no consistent hydraulic conductivity response at high salt concentrations.

Centre for Water Resources Studies, February 2001, The Effect of Water Softeners on Onsite Wastewater Systems, DalTech, Dalhousie University.

Reviews the effect of water softeners on septic systems. Findings include: the volume of regeneration wastewater is not large enough to cause deleterious hydraulic loading problems in septic systems, the addition of water softener wastes may stimulate growth of essential bacteria in septic tanks, available research is insufficient to determine the effects of softener waste water on septic tank mixing, the calcium and magnesium present in softener regeneration waste water help sustain soil permeability.

Corey, R.B., E.S. Tyler, and M.U. Olotu, 1977, Effects of Water Softener Use on the Permeability of Septic Tank Seepage Fields, In Proceedings of Second National Home Sewage Treatment Symposium, Pub. No. 5-77, American Society of Agricultural Engineers, St. Joseph, MI.

Literature review and experimental results. Concludes that salts in wastewater from regeneration of water softeners create no hydraulic conductivity problems in septic-tank seepage fields.

Deal, K., 1998, Analysis of Septic System Failure in Gallatin County, Montana, MSU Extension Service, Bozeman, MT.

Concludes that the most common reasons for septic system failure in Gallatin County are: equipment failure, poor site evaluations, and homeowner neglect or ignorance. Reported results of a 1993 evaluation of 16 MT counties wherein the main causes of septic system failure were: inadequate size or construction, tight soils, system age, improper maintenance, drainfields unlevel or too deep, and cesspools. Water softeners were installed in 30% of the homes investigated.

EPA, 2002, Onsite Wastewater Treatment Systems Special Issues Fact Sheet 3 – Water Softeners, EPA 625 R 00008, U.S. Environmental Protection Agency.

Concludes that calcium and manganese in the softener backwash have no deleterious effect on the septic tank biology, backwash does not cause any hydraulic overload problems, and that soil structure in the drainfield is positively affected by the calcium and magnesium in water softener effluent.

Etzel, J.E., 1978, Softener Brines Do Not Harm Household Sewage Systems, Water Conditioning, September 1978.

Study shows there are no effects on septic tanks and tile fields associated with water softeners. A household water conditioner operated with a normal three times per week regeneration schedule had no effect on the operation or effluent quality of the commercial aerobic wastewater treatment unit.

Grace, R.R., 2002, Petition for Adoption of Rule Amendment, Texas Water Quality Association, Victoria, TX.

Petition to amend on-site waste disposal regulations and allow water softener regeneration wastewater into septic systems. Specifies use of DIR, limits number of regenerations per week, limits volume of regeneration per week and addresses hydraulic overloading.

Great Lakes-Upper Mississippi River Board of State Sanitary Engineers, 1980, Recommended Standards for Individual Sewage Systems, (10 States Standards).

The disposal of brine waste from water softening equipment does not have a significant effect upon the permeability of soils suitable for soil absorption systems. No adverse effect has been shown on microbial action in the treatment tank or upon shallow rooted plant life overlying the soil absorption system. Brine waste may be discharged to the wastewater treatment system.

Hanneman, R., 2003, SARS & Ion-Exchange Water Softening, Water Treatment Dealer May/June 2003.

Modern water softeners discharge less brine per cycle than the models used by scientists to establish the compatibility of softeners and septic systems. Softeners reduce the discharge quantities of other chemicals in soaps, detergents and other cleansing agents required to do common household tasks. The SAR is not a problem for most softener installations. All water softener discharges should be discharged to the seepage field.

Miller, F.P., 1978, Review of the effects of backwash water and regeneration wastes from household water softeners on the hydraulic performance of septic tank seepage systems. Letter to: Daniel W. McNew dated August 4, 1978, Extension University of Maryland, College park, Maryland.

Mr. Miller questioned soil scientists in Pennsylvania, New York, Connecticut, New Hampshire, Vermont and Virginia regarding use of home water softeners and regeneration discharges to septic systems. None reported any problems except Virginia who noted a possible problem on low permeability clays. He further stated that he found no evidence indicating reduced system *performance or longevity. He also suggests that empirical evidence would have presented itself long before now if the water softeners were an important factor in system performance. The National Sanitation foundation had no basis to recommend not using water softeners with on-site waste disposal systems.*

Miller, G.I., 1979, Letter to: Dan McNew dated January 18, 1979, Bureau of Environmental Health, State Department of Health, Maryland, Bel Air, Maryland.

States that Maryland rules are to be changed to allow the discharge of water softener waste to onsite septic systems.

National Sanitation Foundation, July 1978, The Effect of Home Water Softener Waste Regeneration Brines on Individual Aerobic Wastewater Treatment Plants, Water Quality Association, Lisle, IL.

Study examines the effect of home water softener waste regeneration brines on individual aerobic wastewater treatment plants. It concludes that water softener regeneration wastes had no adverse effect on aerobic wastewater treatment plant performance.

Renn, C.E., no date, Effects of Salts on Waste Treatment Systems, Johns Hopkins University, Boston, MA.

It is extremely unlikely that salt concentrations in the mildly inhibitory concentration range will develop in any septic tank system receiving regenerate wastewaters from domestic or institutional softeners. Active biological digestion can be maintained in salt concentrations equal to seawater.

Spratt, M., May 2003. Water Softener's Impact on Septic Systems – Draft, Water Quality Association, Kalispell, Montana.

Overview of on-site waste treatment and water softening processes and the associated effects due to combination of these processes.

Spratt, M., Oct. 2003, Clay soils and processes that affect soil infiltration rates. Letter to Theresa Blazicevich, DEQ, Missoula, Montana.

Reviews the distribution of clay in Montana and the potential mechanisms that cause reduction in infiltration rates of soils.

Spratt, M., March 2004, Effects of changes in soil chemistry on soil infiltration rates. Letter to Raymond Lazuk DEQ, Helena, Montana.

Reviews the potential impact of softened water and regeneration backwash on drainfield performance. Concludes that addition of backwash to the septic tank creates less impact on the drainfield that segregation of the backwash.

Tedrow, J.C.F., 1997, The Effect of Sodium Discharge From Water Softeners Into The Septic Fields of New Jersey, Salt Institute, Alexandria, Virginia.

Evaluates the soil types of New Jersey (predominantly sandy soils) for their suitability for receiving brine discharge from household water softeners. Soils having a sand, loamy sand or sandy loam, sandy clay loam, loam, or some of the silt loam textures should not experience reduced hydraulic conductivity due to sodium discharge.

Texas, 2003, An Act relating to the installation and use of a water softener or reverse osmosis system by an owner of an on-site sewage disposal system. Texas S.B. No. 1633, Legislature of the State of Texas.

Amends the existing Texas statute to allow the use of water softeners and discharge to the septic system with conditions.

Tyler, E.J., R.B. Corey and M.U. Olotu, no date, Potential Effects of Water Softener Use on Septic Tank Soil Absorption On-Site Waste Water Systems, Research Report to the Water Quality Research Council, The Small Scale Waste Management Project, College of Agricultural and Life Sciences, University of Wisconsin-Madison and The Geological and Natural History Survey, University of Wisconsin-Extension, Madison, WI.

The report concludes that salts in the wastewaters from regeneration of water softeners appear to create no hydraulic conductivity problem in septic tank seepage fields. One study indicated that hydraulic conductivity would be improved. Lower hydraulic conductivity in the seepage field may result when the regeneration water is not allowed to enter the seepage field. Use of low salt content source water such as rainwater may also cause lower infiltration rates in the seepage field. Salts added to septic tanks from water softeners should decrease the osmotic stress on microorganisms and therefore enhance the bacterial digestion of wastes in the tank.

Water Quality Association, no date, Effects of Backwash Water and Regeneration Wastes from Household Water Conditioning Equipment on Private Sewage Disposal Systems, Water Quality Association, Lisle, IL.

Reports that salt concentrations of 0.3 - 0.4% stimulated bacterial action in septic sludge and significantly higher concentrations of common salt can be tolerated when mixtures of calcium and magnesium are also present. The values of salt concentrations that retard bacterial action are more than twice those considered to be severe loading from water softeners. Aerobic treatment systems are less affected by softener regeneration wastes than anaerobic units and it has been established that anaerobic septic tanks are not adversely affected by regeneration wastes. Calcium and magnesium in water softener waste brines counteract the effects of sodium on soil. Although the sodium in waste water softener brines may be more than half of the total cations, it does not appear to affect the soil.

Water Quality Association, 2001, Water Hardness, Water Quality Association, Lisle, IL.

Fact sheet describing water hardness and the water softening process.

Water Quality Association, 1989, WQA Position Paper on Septic Tank Effluent Disposal, Water Quality Association, Lisle, IL.

Available information demonstrates the wastewater and mixed brines from filters and water softeners have no significant effects on on-site sewage disposal systems.

Water Quality Research Council, no date, Water Softeners Pose No Problems for Septic Tanks - Executive Summary, Research Report R12, Water Quality Association, Lisle, IL.

Water softener waste effluents actually exert a beneficial influence on a septic tank system. The volume of softener waste are not of sufficient volume to cause any deleterious hydraulic load problems in septic tank systems. Water softener regeneration wastes may improve soil percolation, particularly in fine textured soils.

Wood, F.O., 1984, the Results of Putting Brine Effluent into a Septic Tank Drainage System, Michigan Water Quality Association, Shanty Creek, Bellaire, MI.

Literature review documenting no adverse affects to septic tanks and drainfields due to water softener use and discharge of softener wastewater to septic systems.